



General

Guideline Title

National Athletic Trainers' Association position statement: prevention of pediatric overuse injuries.

Bibliographic Source(s)

Valovich McLeod TC, Decoster LC, Loud KJ, Micheli LJ, Parker JT, Sandrey MA, White C. National Athletic Trainers' Association position statement: prevention of pediatric overuse injuries. *J Athl Train.* 2011 Mar-Apr;46(2):206-20. [PubMed](#)

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

The Strength of Recommendation Taxonomy (SORT) (A-C) is defined at the end of the "Major Recommendations" field.

Injury Surveillance

1. Research should be devoted to improved understanding of the prevalence, incidence, and economic cost of overuse injuries among pediatric athletes in the United States and should focus on prevention and treatment of these overuse injuries (Mountjoy et al., 2008; "Sports and children," 1998). *Evidence Category: C*
2. Funding and support for research into the prevalence, incidence, prevention, and treatment of pediatric overuse injuries should be increased (Mountjoy et al., 2008; "Sports and children," 1998). *Evidence Category: C*
3. All athletic health care providers should participate in injury-surveillance efforts, including accurate documentation in keeping with good clinical practice, and Web-based and other registries (Mountjoy et al., 2008; "Sports and children," 1998; Almquist et al., 2008). *Evidence Category: C*
4. Resources and training for athletic health care providers (e.g., certified athletic trainer, physician, physical therapist) to collect high-quality injury data must be developed (Mountjoy et al., 2008; "Sports and children," 1998). *Evidence Category: C*

Preparticipation Physical Examination

1. The preparticipation physical examination (PPE) should be used as a means to screen each athlete for potential risk factors, including injury history, stature, maturity, joint stability, strength, and flexibility, which may be important for preventing recurrent injuries (American College of Sports Medicine, 1993; Dalton, 1992; Hergenroeder, 1998; Caine, DiFiori, & Maffulli, 2006). *Evidence Category: C*
2. Children and adolescents with noted deficits on the PPE should be referred to appropriate medical specialists and health care providers

(e.g., physician specialist, certified athletic trainer, physical therapist) for further evaluation and corrective rehabilitation (American College of Sports Medicine, 1993; Hergenroeder, 1998). *Evidence Category: C*

3. Robust documentation and injury-surveillance systems need to be developed to link PPE findings with injury, thereby identifying which measured factors may confer increased risk (Almquist et al., 2008; Bernhardt & Roberts, 2010). *Evidence Category: C*
4. More research is needed to improve the effectiveness of the PPE, including strategies to implement the beneficial components more consistently and efficiently in the context of broader health-supervision and morbidity-prevention efforts for adolescents. (Almquist et al., 2008; Bernhardt & Roberts, 2010). *Evidence Category: C*

Identification of Risk Factors

1. Arm pain, fatigue, and decreased throwing performance should be recognized by athletes, coaches, parents, and medical personnel as early warning signs of potential overuse injuries in pediatric throwers (Lyman et al., 2001; Olsen et al., 2006). *Evidence Category: A*
2. Decreasing the volume of pitches as a means to prevent overuse injuries in throwing athletes is recommended (Olsen et al., 2006; Lyman et al., 2002; Andrews & Fleisig, 1996). *Evidence Category: A*
3. Health care professionals should recognize that certain anatomic factors may predispose the athlete to overuse injury, including leg-length discrepancies, genu valgus, genu varus, pelvic rotation, and generalized joint hypermobility (DiFiori, 2002; Lysens et al., 1989; Klemp, Stevens, & Isaacs, 1984; Acasuso Diaz, Collantes Estevez, & Sanchez Guijo, 1993; Gedalia & Press, 1991). *Evidence Category: C*

Coach Education and Medical Supervision

1. Pediatric athletes, parents, and coaches should be educated about the signs and symptoms of overuse injuries, and athletes should be instructed to notify an adult when such symptoms occur (Lyman et al., 2001; Olsen et al., 2006; Hodson, 1999). *Evidence Category: A*
2. Coaches of youth and high school sports should have certifications or credentials identifying specific knowledge in areas related to sports safety, sports techniques and skills, psychosocial aspects of childhood and adolescence, growth and development, and common health and medical concerns ("Sports and children," 1998; Caine, DiFiori, & Maffulli, 2006; Ransone & Dunn-Bennett, 1999; Valovich McLeod et al., 2008). *Evidence Category: C*
3. Organized youth and interscholastic sports should be supervised by adults, ideally those with knowledge and training in monitoring for overuse injuries (American College of Sports Medicine, 1993; "Sports and children," 1998). *Evidence Category: C*
4. Medical personnel with training and education in pediatric sports injuries should be identified as referral sources to recognize, evaluate, and rehabilitate suspected overuse injuries (Almquist et al., 2008; Caine, DiFiori, & Maffulli, 2006). *Evidence Category: C*

Sport Alterations

1. Emerging evidence indicates that the sheer volume of sport activity, whether measured as number of throwing repetitions (Lyman et al., 2001; Olsen et al., 2006; Lyman et al., 2002; Andrews & Fleisig, 1996; Carson & Gasser, 1998) or quantity of time participating (Ohta-Fukushima et al., 2002; Loud et al., 2005), is the most consistent predictor of overuse injury. Efforts should be made to limit the total amount of repetitive sport activity engaged in by pediatric athletes to prevent or reduce overuse injuries. *Evidence Category: B*
2. Although injury thresholds are yet to be determined for specific activities and age ranges, some data suggest a general guideline of no more than 16 to 20 hours per week of vigorous physical activity by pediatric athletes (Loud et al., 2005). *Evidence Category: B*
3. Alterations or modifications to the existing rules for adult sports may help to prevent overuse injuries in pediatric athletes and should be considered by coaches and administrators for sports in which youth rules are lacking (American College of Sports Medicine, 1993; "Sports and children," 1998; Brenner, 2007). *Evidence Category: C*
4. Adults should ensure that pediatric athletes play only 1 overhead throwing sport at a time, avoid playing that sport year-round, and use caution when combining pitching with other demanding throwing positions (e.g., pitch 1 day and catch the next day) to ensure adequate time for recovery (Cassas & Cassettari-Wayhs, 2006; Carson & Gasser, 1998; Benjamin & Briner, 2005). *Evidence Category: C*
5. Parents and coaches should restrict the use of breaking pitches in order to prevent pitching-related arm injuries (Lyman et al., 2002). If an individual pitcher can throw breaking pitches on a limited basis and remain symptom free, then it may be allowed; however, if the use of this pitch precedes the development of any throwing-related symptoms, it should be immediately terminated and the athlete should seek medical attention. *Evidence Category: C*
6. Pitching limits should be established for players 9 to 14 years old: full-effort throwing (i.e., in competition) should be limited to 75 pitches per game, 600 pitches per season, and 2000 to 3000 pitches per year (Lyman et al., 2002; American Sports Medicine Institute, 2009). *Evidence Category: B*
7. Pitchers between 15 and 18 years of age should throw no more than 90 pitches per game and pitch no more than 2 games per week (Andrews & Fleisig, 1996; American Sports Medicine Institute, 2009). *Evidence Category: C*

See Table 6, "Recommendations for Pitch Counts on the First 4 Days After a Pitching Event"; Table 7, "Suggested Sport-Modification Recommendations for Adolescent Pitchers"; and Table 8, "Developmental Progression for Pediatric Swimmers," in the original guideline document

for more recommendations.

Training and Conditioning Programs

1. Preseason and in-season preventive training programs focusing on neuromuscular control, balance, coordination, flexibility, and strengthening of the lower extremities are advocated for reducing overuse injury risk, especially among pediatric athletes with a previous history of injury (Emery et al., 2005; Junge et al., 2002; Olsen et al., 2005). *Evidence Category: A*
2. All pediatric athletes should begin participating in a general fitness program, emphasizing endurance, flexibility, and strengthening, at least 2 months before the sport season starts (American College of Sports Medicine, 1993; DiFiori, 2002; Flynn, Lou, & Ganley, 2002; Faigenbaum & Micheli, 2000). *Evidence Category: C*
3. Pediatric athletes should have at least 1 to 2 days off per week from competitive practices, competitions, and sport-specific training (Mountjoy et al., 2008; Brenner, 2007). Coaches and administrators should consider these required days off when organizing season schedules. *Evidence Category: C*
4. Pediatric athletes should participate on only 1 team of the same sport per season when participation on 2 or more teams of the same sport (e.g., high school and club) would involve practices or games (or both) more than 5 days per week (Brenner, 2007). *Evidence Category: C*
5. Progression of training intensity, load, time, and distance should only increase by 10% each week to allow for adequate adaptation and to avoid overload (American College of Sports Medicine, 1993; Brenner, 2007). *Evidence Category: C*
6. After injury or delayed time without throwing, pediatric throwing athletes should pursue a gradual return-to-throwing program over several weeks before beginning or resuming full throwing activities (Cassas & Cassettari-Wayhs, 2006; Benjamin & Briner, 2005). *Evidence Category: C*

Delayed Specialization

1. Pediatric athletes should be encouraged to participate in multiple sports and recreational activities throughout the year to enhance general fitness and aid in motor development (American College of Sports Medicine, 1993; "Sports and children," 1998). *Evidence Category: C*
2. Pediatric athletes should take time off between sport seasons and 2 to 3 nonconsecutive months away from a specific sport if they participate in that sport year-round (Brenner, 2007). *Evidence Category: C*
3. Pediatric athletes who participate in simultaneous (e.g., involvement in high school and club sports at the same time) or consecutive seasons of the same sport should follow the recommended guidelines with respect to the cumulative amount of time or pitches over the year (Brenner, 2007). *Evidence Category: C*

Conclusions

The major objective in managing repetitive or training injuries in athletes of any age should be to determine risk factors for injury and identify steps to prevent the occurrence of these injuries. Knowledge is growing about risk factors for the occurrence of both acute traumatic injuries and repetitive microtrauma overuse injuries in adults, particularly in such activities as military training, work activities, and sports. However, too little is known about risk factors for overuse injury in pediatric athletes.

Injury surveillance in young athletes should be improved to record the occurrence of injury and the determination of associated risk factors, as well as epidemiologic data (e.g., age, sex, height, mass, and, if possible, Tanner stage). Epidemiologic studies in specific environments in pediatric populations would add greatly to the understanding of the risk associated with particular sport activities, thus providing a foundation for future studies of prevention and treatment efficacy.

Definitions:

Strength of Recommendation Taxonomy (SORT)

Strength of Recommendation	Definition
A	Recommendation based on consistent and good-quality patient-oriented evidence*
B	Recommendation based on inconsistent or limited-quality experimental evidence*
C	Recommendation based on consensus, usual practice, opinion, disease-oriented evidence*, or case series for studies of diagnosis, treatment, prevention, or screening

Reprinted with permission from "Strength of Recommendation Taxonomy (SORT): A Patient-Centered Approach to Grading Evidence in the Medical Literature," February 1, 2004, American Family Physician.

*Patient-oriented evidence measures outcomes that matter to patients: morbidity, mortality, symptom improvement, cost reduction, quality of life. Disease-oriented evidence measures intermediate, physiologic, or surrogate end points that may or may not reflect improvements in patient outcomes (i.e., blood pressure, blood chemistry, physiological function, and pathological findings).

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Overuse injuries

Guideline Category

Prevention

Risk Assessment

Clinical Specialty

Family Practice

Pediatrics

Preventive Medicine

Sports Medicine

Intended Users

Allied Health Personnel

Health Care Providers

Physicians

Guideline Objective(s)

To provide certified athletic trainers, physicians, and other health care professionals with current best practice recommendations regarding the prevention of overuse injuries in pediatric athletes aged 6 to 18 years

Target Population

Pediatric athletes, including children (aged 6 to 12 years) and adolescents (aged 13 to 18 years)

Interventions and Practices Considered

1. Pre-participation physical examination
2. Referral to specialists
3. Identification of risk factors
4. Education of pediatric athletes, parents, and coaches
5. Injury surveillance
6. Sport alterations
7. Training and conditioning programs
8. Delayed sports specialization

Major Outcomes Considered

- Incidence and rates of overuse injuries in pediatric athletes
- Risk factors predisposing to overuse injuries
- Effectiveness of training and conditioning and delayed specialization

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The following databases were searched: Cochrane database, PubMed, Medline via Ovid, CINAHL, SportDiscus. Hand searches of references in retrieved papers and of similar consensus statements from like organizations (e.g., American College of Sports Medicine [ACSM], International Olympic Committee [IOC], American Academy of Pediatrics [AAP]) were performed.

The initial article search took place between January and August 2008. As relevant articles were published between 2008 and 2010, they were included in the revisions during the review process as appropriate. Included articles were dated 2010 or earlier. The guideline developers did not limit the earliest articles included in the search.

The following key terms associated with the statement were used: pediatric, child\$, adolescent, overuse, microtrauma, prevention, baseball, Osgood Schlatter, osteochondritis dissecans, stress fracture, incidence, prevalence, risk factors, surveillance, pre-participation examination, screening, specialization, chronic injuries, growth.

While the guideline developers aimed to include evidence of Level 4 or higher (Oxford), they did include some consensus statements and narrative reviews (Level 5) from other organizations. Articles published in languages other than English were excluded.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Not stated

Rating Scheme for the Strength of the Evidence

Not applicable

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Strength of Recommendation Taxonomy (SORT)

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Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

References Supporting the Recommendations

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Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate prevention of pediatric overuse injuries

Potential Harms

Not stated

Qualifying Statements

Qualifying Statements

The National Athletic Trainers' Association (NATA) publishes its position statements as a service to promote the awareness of certain issues to its members. The information contained in the position statement is neither exhaustive nor exclusive to all circumstances or individuals. Variables such as institutional human resource guidelines, state or federal statutes, rules, or regulations, as well as regional environmental conditions, may impact the relevance and implementation of these recommendations. The NATA advises its members and others to carefully and independently consider each of the recommendations (including the applicability of same to any particular circumstance or individual). The position statement should not be relied upon as an independent basis for care but rather as a resource available to NATA members or others. Moreover, no opinion is expressed herein regarding the quality of care that adheres to or differs from NATA's position statements. The NATA reserves the right to rescind or modify its position statements at any time.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Valovich McLeod TC, Decoster LC, Loud KJ, Micheli LJ, Parker JT, Sandrey MA, White C. National Athletic Trainers' Association position statement: prevention of pediatric overuse injuries. *J Athl Train.* 2011 Mar-Apr;46(2):206-20. [PubMed](#)

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2011 Mar-Apr

Guideline Developer(s)

National Athletic Trainers' Association - Professional Association

Source(s) of Funding

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Guideline Committee

Not stated

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Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the [National Athletic Trainers' Association \(NATA\) Web site](#) .

Availability of Companion Documents

None available

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on December 12, 2012. The information was verified by the guideline developer on January 30, 2013.

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